USER'S MANUAL

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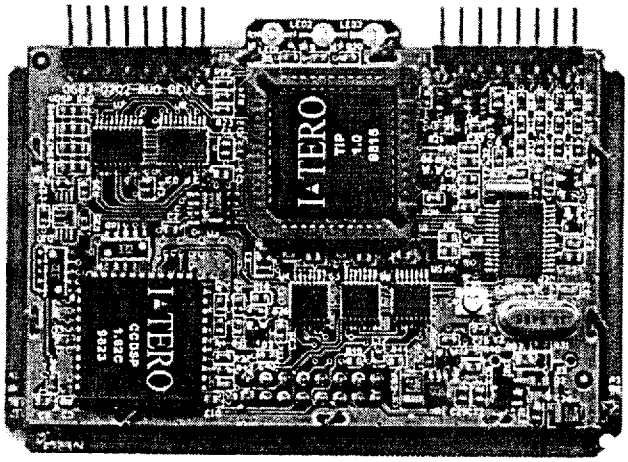
I▲TERO
TECHNOLOGIES COMPANY

AX-550

Development System



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USER'S MANUAL

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INTRODUCTION:

This manual provides an overview of the use and operation of the AX-550 Development System. The AX-550 provides state of the art, spread spectrum communication capabilities at narrow-band cost. Some of the many advanced product features of the AX-550 include:

Feature List

AX-550 Credit Card Transceiver

- Superior communication reliability using direct sequence spread spectrum.
- -110 dBm Sensitivity @ 19.2 Kb/s with CRC 16 Error Detection/Correction.
- Excellent Jam Resistance.
- FCC Unlicensed Operation.
- Frequency and Antenna Diversity.
- 6 Frequency Channels and 6 CDMA Channels.
- Battery Low Indication.
- 32 kHz Oscillator/Timer with 5 µA Sleep Mode.
- Supports CSMA (listen before talk).
- Repeater Mode.
- Controller Mode senses and activates External Inputs and Single Driver Output.
- Uses State of the Art Spread Spectrum Technology.
- Patented and patent-pending technology.

AX-107

- True RS 232 interface for AX-550 Application Development
- Battery Holder for Demonstration Mode Operation
- Wall Adapter regulator for Development Mode
- Jumper Selectable Demonstration Mode/Application Development Mode
- Terminal block for Application Development

Contents:

Each AX-550 Development System contains the following:

- 2 AX-550 Credit Card Transceivers
- 4 Duracell DL123A batteries
- 2 AX-107 Interface Boards
- 2 Wall Adapters
- 2 DB9 to RJ12 Connectors Adapters
- 2 Serial Cables with RJ12 Connectors
- User's Manual
- CDROM (includes ARTIST, VEGA, WinDana, and RadioChat)

AX-550 Credit Card Transceiver with AX-107 Interface Board

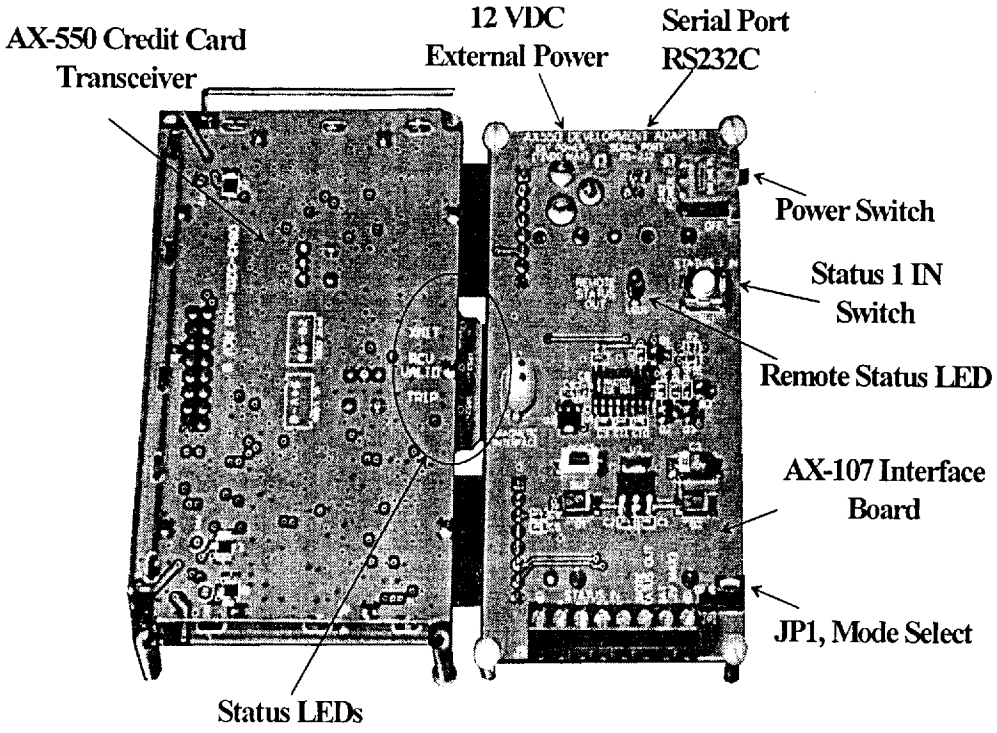


Figure 1

Modes of Operation:

DEMONSTRATION MODE

Overview:

Demonstration mode uses both AX-550 transceivers mounted in the AX-107 Interface Boards. In Demonstration mode, the transceivers continually communicate to each other enabling the user to evaluate the performance of the transceivers in a variety of applications. A momentary push-button on each AX-107 board triggers the transceiver to send a status message to the companion transceiver which in turn lights an LED on its respective AX-107 adapter.

Hardware Configuration:

Demonstration mode requires both of the AX-550 Credit Card Transceivers and both of the AX-107 Interface Boards. The AX-550 and AX-107 should be assembled as depicted in figure 1. Closing jumper JP1 pins 1 & 2 sets the unit in Demonstration mode (jumper toward the AX-550). Ensure that the AX-107 power switch is ON.

Both AX-550 transceivers and AX-107 Adapters must be configured for Demonstration mode for proper operation. Both units must be powered using either batteries or the wall adapter provided in the development kit.

The unit will operate using two Duracell DL123A or equivalent 3 Volt lithium batteries. Four batteries are provided in the AX-550 Development System. Additional batteries can be purchased from most drug stores.

The AX-550 is constantly active during Demonstration mode. If batteries are used as a power supply for the AX-107 Interface Board, battery life will be approximately 6 hours.

Caution! ***Observe Battery Polarity While Inserting Batteries***

Operation:

Pressing the Status1 IN button on the AX-107 Interface Board causes a test transmission to be sent from one AX-550 transceiver to the other which in turn lights the Remote Status LED on the receiving unit. The lit LED confirms that the receiving unit captured the status from the sending unit correctly. Releasing Status1 IN button relays the state change to the receiving unit which responds by turning off the Remote Status LED. The operation is full duplex, as either unit may send and receive asynchronously.

The units continually communicate to each other while in Demonstration mode. Normal operation is indicated by small flashing LEDs observable between the AX-550 and AX-107 assemblies. These LEDs indicate trip, message available and transmit functions on the AX-550. Normal operation will exercise each of these LEDs in addition to the Remote Status LED lit by manually depressing the Status1 IN switch.

The operability of the device can therefore be evaluated by monitoring the status of the indicators respective to the physical proximity of the device to structures, orientation of antenna and elevation of device.

As a rule, all radio devices operate best in line of sight applications, with varying degradation in performance due to obstruction and interference. The AX-550 contains state of the art direct sequence spread spectrum modulation techniques using advanced digital signal processing acquisition algorithms. The AX-550 is designed to operate in the most aggressive of radio frequency environments.

If the units fail to function, first check to see that the AX-550 is properly connected to the AX-107, fresh batteries are installed in each of the AX-107 Interface Boards, and that each AX-107's jumper is properly placed connecting pins 1 and 2 (Demo Mode).

APPLICATION DEVELOPMENT MODE

Overview:

Application Development mode enables the user to connect each transceiver to a PC. The user may then use one of the evaluation software packages provided in the AX-550 Development System or write custom applications for configuring and controlling the transceivers.

Application Development Mode requires the Mode Select jumper be set to pins 2 and 3 (away from transceiver). The following application software programs require this configuration Figure 2.

Software Overview:

A software development CD is included in each AX-550 Development System. The CD contains four applications to assist in the transceiver application and development. These four applications are ARTIST, VEGA, WinDana, and RadioChat. Each program is designed to operate on a Windows 95/98/NT © based PC with at least one serial port available.

The four programs address different needs and provide different levels of interface. ARTIST provides a means to completely configure and control and use the transceiver. It includes access to every feature available as well as embedded on-line help for all interface protocols.

VEGA is a scaled back version of ARTIST which enables a user to immediately setup and use the transceiver device. Most of the controls and features are defaulted in VEGA. VEGA provides a very quick method to graphically evaluate a communication link and log data to file for post-processing.

WinDana is a post-processing engine which enables statistical analysis of data collected with ARTIST or VEGA.

RadioChat is an application which uses the pair of transceivers to operate as an RF modem coupling two PCs via send/receive scrolling text windows.

Software Installation:

To Install ARTIST, VEGA, WinDana, or RadioChat first insert the software CD included with your AX-550 development kit. The CD should autorun the installer, but if it does not, simply run the INSTALLER.EXE file at the CD root. From Installer you can select which programs you would like to install. To select a program to install click on the desired program and the installer shield will begin installation. Follow the installation directions to complete the installation. Following installation, you can launch the program using from the Windows 95/98/NT START, PROGRAMS dialog.

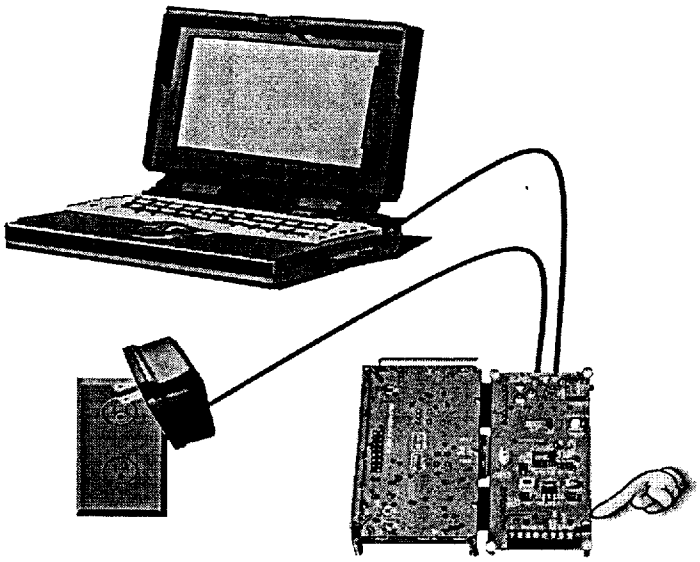


Figure 2
Hardware Configuration

HARDWARE CONFIGURATION:

Mode Select Jumper should be connected between pins 2 and 3 for application support. One end of the RJ12 cable should be connected to the AX-107 Development Adapter and the other end to the RJ12 to DB9 adapter. The adapter connects to any 9-pin serial port on a PC.

The AX-107 Interface Board operates on either battery power or from wall AC. To supply the AX-107 with AC wall power plug the wall adapter into a 110 Volt wall outlet. Then connect the opposite side of the cable to the AX-107 Interface Board (Figure 2). Ensure that the AX-107 power switch ON.

ARTIST:

ARTIST is a comprehensive toolset for configuring and controlling the transceiver. It contains detailed embedded help files for use and also contains an on-line protocol specification should the user wish to write application software.

ARTIST will auto-detect for radio devices connected on any serial port by pressing Ctrl-A. If devices are found, they are created in ARTIST and two windows are created for each device, one for the receiver section and one for the transmitter section. Pressing the F3 key followed by the F1 key configures each device. Repeat this process after selecting the transmitter Setup Window. When the devices are setup, each row of LED indicators should match. If the indicators do not match, repeat the F3 and F1 keystroke until the indicators match properly. If this does not work, hit the K key for each device. Then hit the F3 and F1 keystroke and

each device will be setup. Once each device is setup, the receiver poll windows should start displaying idle messages. Idle messages are described in detail in the Enhancing Binary Message Protocol (EBMP) document available online through ARTIST Help. The transmitters are also ready to transmit data by using the load transmitter data file. By Dragging the Message Bar on the transmitter menu and selecting "Whole Message" and then selecting repeat the transmitter will transmit a message every x seconds. The Shortcut for "Whole Message is F8. The Repeat Button is located on the Transmitter window.

Don't forget about the extensive Help file accessible by clicking on the Help topics item under the Help menu.

VEGA:

VEGA is a program that easily allows a user to visually analyze on-air data. VEGA will automatically search for and detect all serial compatible radio devices attached to your system when launched. Each device found will generate a prompt box for the user to acknowledge device use.

The main window of VEGA will then pop up. A scrolling text box at the upper right shows the poll status of each receiver. A dialog box at the upper left shows all the detected remote devices being received by the attached receivers. Clicking the mouse in the check box to the left of a detected remote device will launch a graphical window showing signal statistics versus time.

Data may be logged to disk for post analysis by clicking on the Log button and following the given instructions.

WinDana:

WinDana is a program that allows a user to visually analyze data contained in a log file produced by ARTIST or VEGA. Launching WinDana will prompt the user for a log file. This is a file with a .gbf extension that was logged previously with ARTIST or VEGA. WinDana will then take a moment to load and analyze this file. WinDana's main window will then appear, giving information about every receiver and transmitter that is contained in the log file. Check the box next to the desired transmitter to graph the data from a specific transmitter.

RadioChat:

RadioChat is a program that can use two transceivers to communicate over a wireless connection, much like an Internet chat program.

To use RadioChat, simply run the program on two computers that both have an Itero transceiver. Then, type in the lower box. The text will be sent to the other computer running RadioChat.

In order to have multiple connections running at the same time, you can change the RF frequency and spread spectrum channel simply by choosing one with the drop-down boxes at the bottom of RadioChat. The program on the other end will automatically change channel and frequency to match.

Software Development:

The CD included with the AX-550 Development System contains two 32 bit Windows © Dynamic Link Libraries (DLLs). These Dynamic Link Libraries are EBMP.dll, which encapsulates the serial protocol used by serial compatible devices, and EbmpGraph.dll which can graphically display signal parametrics. Developer's References for these tools can be located online in ARTIST and VEGA help files.

FCC Compliance Statement:

The AX-550 Development System has not been approved or certified for use by the FCC in accord with Part 15, ETSI, I-ETS 300 220 regulations, or other standards of operation governing radio emissions. Distribution and sale of the device is intended solely for use in future development of devices which may be subject to FCC regulation. This device may not be resold by user for any purpose. Accordingly, operation of this system in the development of future devices is deemed within the discretion of the user and user shall have all responsibility for any compliance with any FCC regulation of such development or use, including without limitation reducing electrical interference to legally acceptable levels. All products developed by user must be approved by the FCC prior to marketing or sale of such products and user bears all responsibility for obtaining the FCC's prior approval.

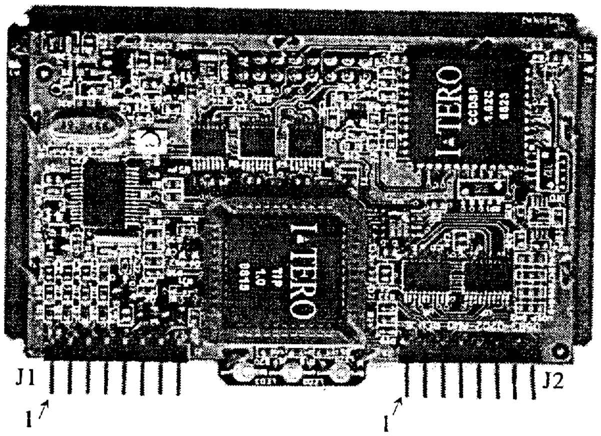
FCC Disclaimer:

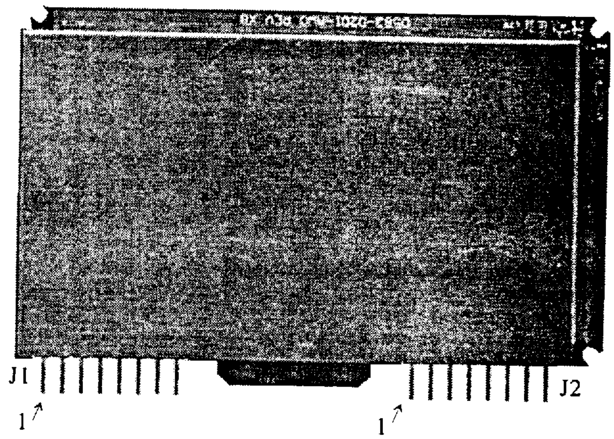
The AX-550 Development System is intended for use solely by professional engineers for the purpose of evaluating the feasibility of low-power wireless data communications applications. Manufacturer recommends that the user's evaluation be within a laboratory setting. If field tested, the assembled device must not be operated in any area where radio devices might be subjected to harmful electrical interference.

If user has obtained the Development System for any purpose not identified above, including all conditions for assembly and use, user should return the Development System to manufacturer immediately.

THIS SUBASSEMBLY HAS NOT BEEN SUBMITTED TO, OR APPROVED FOR USE BY, THE FEDERAL COMMUNICATIONS COMMISSION. User accepts all responsibility for assuring compliance with federal law in the operation of this subassembly, including obtaining all necessary prior FCC approval for the manufacturer, marketing or sale of any final device employing this unit.

AX-550 Pinout





J1	
1	ALARM1
2	ALARM2
3	ALARM3
4	ALARM4
5	OC Out
6	VBAT
7	uC I/O
8	GND

J2	
1	MSG AVAIL-
2	SER RTS
3	SER CTS
4	MAG LOOP IN
5	VBAT
6	SER TX
7	SER RX
8	GND

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